

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 28, 2008 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4-8, 10-14, 16-20, and 22-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Regarding claims 1, 7, 13, and 19, the limitation “the passivation layer including silicon dioxide and silicon nitrides” is not sufficiently supported by the originally filed application. Paragraph [0054] of the specification states: “Passivation layer 40 may comprise any of a variety of materials, including silicon dioxide and silicon nitride as examples”. This passage implies that the passivation layer can be formed of, for example, silicon dioxide or silicon nitride. It does not provide explicit (or implicit) support for a

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passivation layer having both silicon dioxide and silicon nitride. The passage certainly does not support having more than one silicon nitride (the claim states "silicon nitrides").

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2, 4-8, 10-14, 16-20, and 22-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 7, 13, and 19, the limitation "the passivation layer including silicon dioxide and silicon nitrides" renders the claims indefinite. It is unclear if Applicant is intending to claim a layer comprising both silicon dioxide and silicon nitride, or if the layer merely requires one of the two. Further it is unclear what is meant by "silicon nitrides". Is Applicant attempting to claim that the passivation layer has more than one nitride layer, possibly two different types of silicon nitride? For the purposes of the below art rejections, it is assumed that the claim merely requires a passivation layer including one of silicon dioxide or silicon nitride. If Applicant intended to claim a passivation layer containing both silicon dioxide and silicon nitride, the limitation is new matter as indicated above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 7, 13, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginn et al. (US Pat. 5,827,771, hereinafter Ginn) in view of Ishikawa (US PGPub 2002/0064930).

Regarding claims 1, 7, 13 and 19, Figure 2 of Ginn discloses a semiconductor die comprising: a semiconductor substrate 12 having a front side 12c and a back side 12b, a low ratio of height to horizontal dimension (see fig. 2), tensile stresses, and compressive stresses; an integrated circuit (IC) on a portion 14 of the front side; and a stress-balancing layer 18 covering at least a portion of the backside. Further, the limitation “chemical vapor deposition material” is a product-by-process limitation that does not patentably distinguish the claimed invention over the prior art. The silicon nitride layer 18 of Ginn could have been deposited by CVD, and therefore satisfies this limitation.

Ginn does not explicitly disclose a passivation layer covering a portion of the IC. Figure 1 of Ishikawa discloses a SiN passivation layer 3 (paragraph [0045]) formed on an IC chip 1. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Ginn by including a SiN passivation layer on the IC portion for the purpose of protecting the circuitry in layer 14. After the combination, the SiN passivation layer will inherently exert at least a small amount of stress (either tensile or

compressive) on the substrate. The SiN stress-balancing layer 18 will inherently balance the small amount of additional stress imparted by the passivation layer.

Note that a compressive stress in a first direction (e.g., vertical) creates a tensile stress in a direction perpendicular to the first direction (e.g., horizontal) (and vice versa). Therefore, the substrate has both compressive and tensile stresses.

Regarding claims 2, 8, 10, 14, 16, 20 and 22, Ginn teaches that the balancing layer 18 is a SiN film, which may be considered a single component layer. The limitations “sensitive to an optical energy altering the material by at least one of heating...” and “for laser-marking” are merely recitations of intended use that do not structurally distinguish the claimed invention over the prior art. The balancing layer is capable of being modified (marked) by laser beam.

Claims 5, 6, 11, 17, 23, and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Ginn in view of Ishikawa as applied to claims 1, 7, 13, and 19 above, and further in view of Sakaki et al. (US PGPub 2003/0017652, hereinafter Sakaki).

Regarding claims 5, 6, 11, 17, 23 and 24, Ginn does not disclose an adhesive layer attached to the stress balancing layer. Sakaki teach in figure 9 an adhesive layer 41A attached to a stress-balancing layer 2 (para. 0136). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Ginn by including the adhesive layer of Sakaki for the purpose of mounting the IC chip to a support structure. The limitation “sensitive to an optical energy altering the material by at least one of heating...” are merely recitations of intended use that do not structurally distinguish the claimed

invention over the prior art. The adhesive material is capable of being modified (marked) by laser beam.

Claims 1, 2, 7, 8, 10, 13, 14, 16, 19, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiao (US Pat. 6,277,725) in view of Sakaki.

Regarding claims 1, 7, 13, and 19, Figure 1A of Hsiao discloses a semiconductor die comprising: a semiconductor substrate 100 having a front side (top) and a back side (bottom), a low ratio of height to horizontal dimension, tensile stresses, and compressive stresses; an integrated circuit (IC) on a portion 14 of the front side; and a passivation layer 104/106 covering a portion of the IC causing a stress on at least a portion of the substrate (inherent), the passivation layer including silicon dioxide (layer 104) and silicon nitride (layer 106) (col. 2, lines 34-36). Hsiao does not specifically disclose a stress-balancing layer formed on the back side of the substrate to balance the stress caused by the passivation layer. Figure 3 of Sakaki discloses an IC device with a stress-balancing layer 2 balancing the stress caused by an overlying passivation layer 7 (see paragraphs [0106] and [0107], esp. [0107] at the third sentence, which teach that layer 7 causes a stress which is compensated by layer 2). Sakaki further teaches that the passivation layer 7 and the stress-balancing layer 2 are made of the same material (thermosetting resin) (paragraphs [0105] and [0107]). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Hsiao by including a stress-balancing layer made of the same materials as the passivation layer (as taught by Sakaki) for the purpose of preventing substrate warping, as is known in the

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art. Furthermore, it has been held that using a known technique to improve similar devices in the same way would have been obvious. *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007). Note that a stress balancing layer made of the same materials as the passivation layer (SiO and SiN) of Hsiao could have been deposited by CVD. Therefore, the limitation "a chemical vapor deposition material" is merely a product-by-process limitation that does not structurally distinguish the claimed invention over the prior art.

Regarding claims 2, 8, 10, 14, 16, 20 and 22, after the above combination, Hsiao in view of Sakaki teach that the balancing layer comprises a SiN film, which may be considered a single component layer. The limitations "sensitive to an optical energy altering the material by at least one of heating..." and "for laser-marking" are merely recitations of intended use that do not structurally distinguish the claimed invention over the prior art. The balancing layer is capable of being modified (marked) by laser beam.

Claims 1, 2, 7, 8, 10, 13, 14, 16, 19, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiao (US Pat. 6,277,725) in view of Ouellet et al. (US PGPub 2002/0064359).

Regarding claims 1, 7, 13, and 19, Figure 1A of Hsiao discloses a semiconductor die comprising: a semiconductor substrate 100 having a front side (top) and a back side (bottom), a low ratio of height to horizontal dimension, tensile stresses, and compressive stresses; an integrated circuit (IC) on a portion 14 of the front side; and a passivation layer 104/106 covering

a portion of the IC causing a stress on at least a portion of the substrate (inherent), the passivation layer including silicon dioxide (layer 104) and silicon nitride (layer 106) (col. 2, lines 34-36). Hsiao does not specifically disclose a stress-balancing layer formed on the back side of the substrate to balance the stress caused by the passivation layer. Figure 2b of Ouellet a substrate 1 with a passivation layer 3 on a top surface of the substrate and a stress-balancing layer 3 on the bottom surface, wherein the stress-balancing layer balances the stress caused by the overlying passivation layer 2 (see abstract). Ouellet further teaches that the passivation layer and the stress-balancing layer are made of the same material (silica) (paragraphs [0030] and [0031]). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Hsiao by including a stress-balancing layer made of the same materials as the passivation layer (as taught by Ouellet) for the purpose of preventing substrate warping. Furthermore, it has been held that using a known technique to improve similar devices in the same way would have been obvious. *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007). Note that a stress balancing layer made of the same materials as the passivation layer (SiO and SiN) of Hsiao could have been deposited by CVD. Therefore, the limitation "a chemical vapor deposition material" is merely a product-by-process limitation that does not structurally distinguish the claimed invention over the prior art.

Regarding claims 2, 8, 10, 14, 16, 20 and 22, after the above combination, Hsiao in view of Ouellet teach that the balancing layer comprises a SiN film, which may be considered a single component layer. The limitations "sensitive to an optical energy altering the material by at least one of heating..." and "for laser-marking" are merely recitations of intended use that do not

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structurally distinguish the claimed invention over the prior art. The balancing layer is capable of being modified (marked) by laser beam.

Response to Arguments

Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is 571-272-1731. The examiner can normally be reached on 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C. Landau/
Primary Examiner, Art Unit 2815